

AMENDMENTS TO THE CLAIMS

1-6. (Cancelled)

7. (Currently Amended) A thermal system for an electrically-powered vehicle having a power train, the thermal system comprising:

a reconfigurable refrigerant-based automotive air conditioning system to selectively create a plurality of possible refrigerant loops, the refrigerant-based automotive air conditioning ~~subsystem~~ system comprising:

an evaporator having refrigerant channels thermally connected to ventilation air and configurable to receive previously cooled refrigerant, the evaporator operable to cool and dehumidify the flow of ventilation air; ~~and~~

a bi-fluidic heat exchanger having refrigerant channels thermally coupled to coolant channels;

an outside air heat exchanger;

a bidirectional orifice separator within ~~the~~ at least one refrigerant loop of the plurality of possible refrigerant loops, the bidirectional orifice separator comprising:

a first shutoff valve fluidically coupled to the bi-fluidic heat exchanger;

a second shutoff valve fluidically coupled to the outside air heat exchanger;

and

a bidirectional orifice tube coupled in series between the first shutoff valve and the second shutoff valve for expanding refrigerant when the first and second shutoff valves are open;

a compressor;

~~an outside air heat exchanger;~~

an accumulator fluidically coupled to an input of the compressor; and

a 4-way reversing valve configured to receive compressed refrigerant from the compressor and operable to discharge compressed refrigerant into a selected one of the bi-fluidic heat exchanger and the outside air heat exchanger and to receive refrigerant from the non-selected one of the bi-fluidic heat exchanger and the outside air heat exchanger to discharge refrigerant from

the non-selected one of the bi-fluidic heat exchanger and the outside air heat exchanger to the accumulator; and

a reconfigurable liquid-coolant-based automotive heating system ~~for creating at least one loop of the plurality of the~~ to selectively create a plurality of possible coolant loops, wherein the refrigerant-based automotive air conditioning system and the liquid-coolant-based automotive heating system are configured to operate concurrently and in concert.

8. (Cancelled)

9. (Currently Amended) A thermal system according to claim [[8]] 7 wherein the heating system comprises:

a heater core; and

a 3-way valve for transferring coolant to the heater core.

10. (Previously Presented) A thermal system according to claim 9 wherein the evaporator is configured to receive refrigerant previously cooled in a bi-fluidic heat exchanger, the bidirectional orifice separator including the first shutoff valve, configured to permit flow of refrigerant into the bidirectional orifice separator, the second shutoff valve configured to prevent flow of refrigerant into the bidirectional orifice separator, and the 4-way valve configured to select the bi-fluidic heat exchanger, the refrigerant-based automotive air conditioning system thus configured comprising a first refrigerant loop of the plurality of refrigerant loops operable to remove heat from ventilation air during dehumidification and transfer heat through the bi-fluidic heat exchanger to a coolant loop of the coolant-based heating system.

11. (Previously Presented) A thermal system according to claim 10, wherein the coolant loop of the plurality of coolant loops comprises a first coolant loop coupled in series between the heater core and the bi-fluidic heat exchanger, the 3-way valve configured to discharge coolant to the heater core, and the heater core configured to receive coolant from the bi-fluidic heat exchanger.

12-28. (Cancelled)